WHAT IS CLAIMED IS:

1.   A search method comprising the acts of:

    a)   using N bits, N being an integer, from a packet as an index into a data structure including a Direct Table with at least one entry and a tree structure operatively coupled to said one entry;

    b)   setting a threshold based upon a first predetermined characteristic of the tree structure;

    c)   using select bits from the packet to traverse said tree structure until the threshold is met;

    d)   storing in a Contents Address Memory (CAM) at least one entry based upon a predetermined characteristic of the packet and a second predetermined characteristic of said tree structure; and

    e)   using the at least one entry to access a memory location whereat action to be taken relative to the packet is stored.

2.   The method of Claim 1 wherein N includes the first sixteen bits of a Destination MAC Address.

3.   The method of claim 2 wherein the tree structure includes a plurality of nodes and leaves operatively coupled to selected nodes.

1   4.   The method of claim 3 further including Pattern Search Control Blocks (PSCBs) carrying

2   search information positioned at selected nodes.

1   5.   The method of Claim 1 wherein the first predetermined characteristic includes nodes and

2   the threshold is set to a count of the nodes.

1   6.   The method of Claim 2 wherein the selected bits include the remaining thirty two bits of

2   the Destination MAC Address.

   7.   The method of Claim 2 wherein the second predetermined characteristic includes leaves.

1   8.   A method for correlating a search key with a database comprising the acts of:

       a)   using N bits, $N \geq 1$, from the search key as an index into the database including

            entries having a Direct Table with at least one entry and a tree structure

            operatively coupled to said one entry;

5   b)   setting a threshold based upon a first predetermined characteristic of the tree

6   structure;

7   c)   using M bits (M > 1) from the search key to access said tree structure until the

8   threshold is met; and

9   d)   reading from a CAM information that indicates action to be taken relative to the

10   search key.

1   9.   The method of claim 8 wherein the search key includes a portion of a data packet.

1   10.   The method of claim 9 wherein the information includes the address of a leaf in which the

2   action is stored.

1   11.   The method of claim 8 wherein the reading step further includes the step of using the N

2   bits as index into the CAM.

   12.   An apparatus comprising:

             an embedded processor complex including a plurality of protocol processors;

             a control point processor operatively coupled to the processor complex;

             a plurality of hardware accelerator co-processors accessible to each protocol

processor and providing high speed pattern searching, data manipulation and frame

parsing;

7   at least one memory device, operatively coupled to the processor complex, that

8   stores data structures including a Direct Table, nodes and leaves operatively chained

9   together; and

10   a Memory location operatively coupled to the processor complex and storing a

11   value representative of the maximum number of nodes to be accessed during a tree search

12   routine.

1　13.　The apparatus of claim 12 further including a Contents Address Memory (CAM)

2　　　operatively coupled to the processor complex and storing a pointer identifying a location

3　　　whereat a leaf is stored.

1　14.　The apparatus of claim 13 wherein the leaf contains information on actions to be taken

2　　　relative to a packet.

15.　The apparatus of claim 14 wherein the CAM further includes an indicia paired with the

　　　pointer, said indicia being selected from a portion of the packet.

16.　The apparatus of Claim 15 wherein the indicia includes a portion of a Destination MAC

　　　Address in the packet.

17.　The apparatus of Claim 15 further including a circuit that deletes pointers from the CAM

2　　　based upon leaf adjustments in the tree structure and/or NONE use of the information

3　　　within a predetermined time interval.

1　18.　The apparatus of Claim 17 wherein the leaf adjustments include deletion.

1   19.   The apparatus of Claim 12 wherein the Control Point Processor is programmed to

2   generate and forward frames containing information that adjusts the data structure.

1   20.   The apparatus of Claim 19 wherein the adjustment includes leaf deletion and/or insertion.

1   21.   A data structure comprising:

2   a Direct Table having at least two entries;

3   a tree structure operatively coupled to the at least two entries and having a

4   plurality of nodes and leaves operatively chained together; and

5   a storage storing a threshold value indicating the maximum number of nodes to be

6   accessed during a walk of said tree structure.

7   22.   The data structure of Claim 21 further including Contents Address Memory, CAM, in

8   which leaf information is stored if the leaf is connected to a node above the threshold

9   value.

1   23.   The data structure of Claim 22 further including a co-processor responsive to at least a

2   command to use part of the DA of a packet to index into the DT and the remaining part of

3   said DA to search the associated tree, said co-processor selecting, information stored in a

4   leaf if the leaf is attached to a node below the threshold value or selecting information

5   stored in the CAM if the leaf is attached to a node above the threshold value.

1   24.   A system comprising:

2   a processor to provide a key extracted from a data packet;

3   a tree walk logic responsive to use the key to walk a tree structure until a

            threshold is reached;

5   a CAM controller to use the key to search a CAM; and

6   a controller that uses the first available result from the tree walk logic or the CAM

7   controller to determine an action to be taken relative to the data packet.

1   25.   A search method comprising the acts of:

2   (a)   providing a key extracted from a data packet;

3   (b)   using said key by a tree walk logic to search a tree structure until a threshold is

4   reached;

5   (c)   using said key by a CAM controller to search a CAM; and

6   using the first result from acts (b) or (c) to determine an action to be taken relative to the

7   data packet.